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Rogue Weedkiller Vapors Are Threatening Soybean Science

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Heard on All Things Considered

DAN CHARLES

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Transcript

Pengyin Chen, professor of soybean breeding and genetics at the University of Missouri, in his test plots of soybeans near the town of Portageville.

Dan Charles/NPR

Something strange is happening to Pengyin Chen's soybean experiments at the University of Missouri's Fisher Delta Research Center in Portageville, Mo.

"You see how small they are?" says Chen, gesturing at a field filled with thousands of small plots of soybeans.

The leaves ought to be wide and flat; instead, they're curled into cups. Instead of growing straight up, the plants are putting out fragile little side branches. Chen pulls a plant out of the soil to show me. "This plant is not supposed to have a branch there," he says, pointing.

Chen, a professor of soybean breeding and genetics, has a pretty good idea what's going on. He's seen this damage each of the past three years, ever since farmers all around this research station — and across the country — started planting a different version of soybeans. The biotech company Monsanto had genetically modified these new soybeans so that they tolerate a herbicide called dicamba. It allows farmers to spray dicamba on their soybeans; it kills the weeds, but their dicamba-tolerant crop is fine.

The arrival of dicamba has inspired two reactions in farming communities: "Love it or hate it," says Chen.

Farmers who are using the chemical love it. It kills weeds that have become resistant to many other weedkillers. Their neighbors, though — that's a different story.

Dicamba doesn't always stay where it belongs — even new versions of the chemical that have been reformulated to avoid this problem. All over the country, it's been evaporating and floating across the landscape, damaging vegetation that doesn't have those special dicamba tolerance genes. The victims include peach trees, tomato gardens, and historic cypress trees.

Most of the damage has shown up in fields of soybeans that aren't modified to withstand dicamba. Those plants are incredibly sensitive to the chemical.

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Most farmers in the mid-South have now switched over to dicamba-tolerant soybeans. Their fields are safe.

Chen can't switch, though. Because he's supposed to produce knowledge, not more soybeans.

Plant breeding involves taking different plants and cross-pollinating them, reshuffling the genes the way you'd shuffle a deck of cards, looking for the genetic version of a lucky hand — "the magic combination," Chen calls it.

Most new soybean varieties come from breeders at private seed companies. But Chen is a "public" soybean breeder, one of a dozen or so such breeders at universities. They represent a non-commercial alternative to private industry. They create soybean varieties for farmers that are cheaper than commercial varieties, and farmers can also save part of their harvest to use as seed the following year.

Chen's soybeans are not dicamba tolerant, and they're suffering. "It's very discouraging, and very hurtful, as a scientist," he says. "You see all the research being affected. And we were not able to do a scientific analysis of the data."

Public breeders like Chen also act as custodians of genetic diversity. They study obscure kinds of soybeans that private seeds companies ignore, searching for hidden genetic treasures, such as genes that could make soybeans more resilient and productive.

Chen's biggest worry is that drifting dicamba is making it impossible to carry out public research on soybeans here in Portageville and perhaps in other places, too. (It also makes farmers less interested in planting public varieties, since they're vulnerable to dicamba drift.) "If you kill the public research programs, who is going to study disease resistance, or stress tolerance?" Chen asks. "Those efforts are going to be gone."

The taller soybean plants (right) are from a commercial dicamba-tolerant variety. On the left, an experimental line of soybeans showing the effects of dicamba exposure.

Dan Charles/NPR

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Soybean researchers are, in fact, having problems at other universities. In response to NPR's inquiries, soybean breeders at the University of Nebraska, Kansas State, and the University of Arkansas confirmed that they've also seen symptoms of dicamba exposure in their test plots.

At the University of Arkansas's research station in the town of Keiser, in the northeastern Arkansas, station manager Mike Duren showed me a wide field of soybeans showing classic dicamba symptoms: cupped leaves with curled, pointed tips. Across the research station's 700 acres, he says, every single plot of soybeans looks like this — except for the occasional plot of commercial dicamba-tolerant soybeans that researchers have planted as a comparison. It's happening despite a state regulation that bans dicamba spraying within a mile of research facilities.

Even commercial seed companies are seeing the effects of unwanted dicamba vapor. Stine Seed, which is based in Iowa, told NPR in an email that it has "experienced significant problems" with damage in some of its research plots. BASF, a big company that sells both soybean seeds and dicamba herbicide, has seen symptoms of dicamba exposure at its soybean breeding station in Marion, Ark. But Christopher Tinius, BASF's head of soybean breeding, says it has not hindered the company's research efforts. BASF, in fact, has licensed the dicamba-tolerance gene from Monsanto and is planning to start selling dicamba-tolerant soybean seeds within a few years.

The company Bayer, which now owns Monsanto, says dicamba doesn't cause problems when people use it properly, following all the rules. In an email to NPR, the company wrote that it is aware of the damage at Pengyin Chen's research plots at the University of Missouri. The company suggested that perhaps the damage resulted from nearby farmers spraying an older, unauthorized version of the chemical.

Researchers at universities in other places, including Tennessee, Minnesota, and North Carolina, say that their soybean experiments are doing fine. But some of them also say that they are worried about the future. Farmers are planting more dicamba-tolerant soybeans every year, spraying more of this chemical, and increasing the chances that it'll do more damage. Bayer estimates that U.S. farmers will plant about

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50 million acres of dicamba-tolerant soybeans this year. That's 60 percent of all the soybeans planted in the country.

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